

# ZXMN3A04K

## 30V N-CHANNEL ENHANCEMENT MODE MOSFET IN DPAK

### SUMMARY

$V_{(BR)DSS}=30V$  :  $R_{DS(on)}=0.02\Omega$ ;  $I_D=18.4A$

### DESCRIPTION

This new generation of Trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage power management applications.



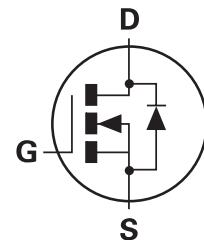
### FEATURES

### DPAK

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- DPAK (TO252) package

### APPLICATIONS

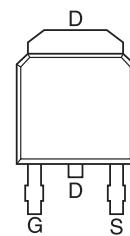
- DC-DC converters
- Power management functions
- Disconnect switches
- Motor control



### ORDERING INFORMATION

### PINOUT

DEVICE	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
ZXMN3A04KTC	13"	16mm	2500 units



### DEVICE MARKING

- ZXMN  
3A04K

### TOP VIEW

# ZXMN3A04K

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	$V_{DSS}$	30	V
Gate-source voltage	$V_{GS}$	$\pm 20$	V
Continuous drain current @ $V_{GS}=10V$ ; $T_A=25^\circ C$ <sup>(b)</sup> @ $V_{GS}=10V$ ; $T_A=70^\circ C$ <sup>(b)</sup> @ $V_{GS}=10V$ ; $T_A=25^\circ C$ <sup>(a)</sup>	$I_D$	18.4 14.7 12.0	A A A
Pulsed drain current <sup>(c)</sup>	$I_{DM}$	66	A
Continuous source current (body diode) <sup>(b)</sup>	$I_S$	11.5	A
Pulsed source current (body diode) <sup>(c)</sup>	$I_{SM}$	66	A
Power dissipation at $T_A = 25^\circ C$ <sup>(a)</sup>	$P_D$	4.3	W
Linear derating factor		34.4	mW/°C
Power dissipation at $T_A = 25^\circ C$ <sup>(b)</sup>	$P_D$	10.1	W
Linear derating factor		80.8	mW/°C
Power dissipation at $T_A = 25^\circ C$ <sup>(d)</sup>	$P_D$	2.15	W
Linear derating factor		17.2	mW/°C
Operating and storage temperature range	$T_j, T_{stg}$	-55 to +150	°C

## THERMAL RESISTANCE

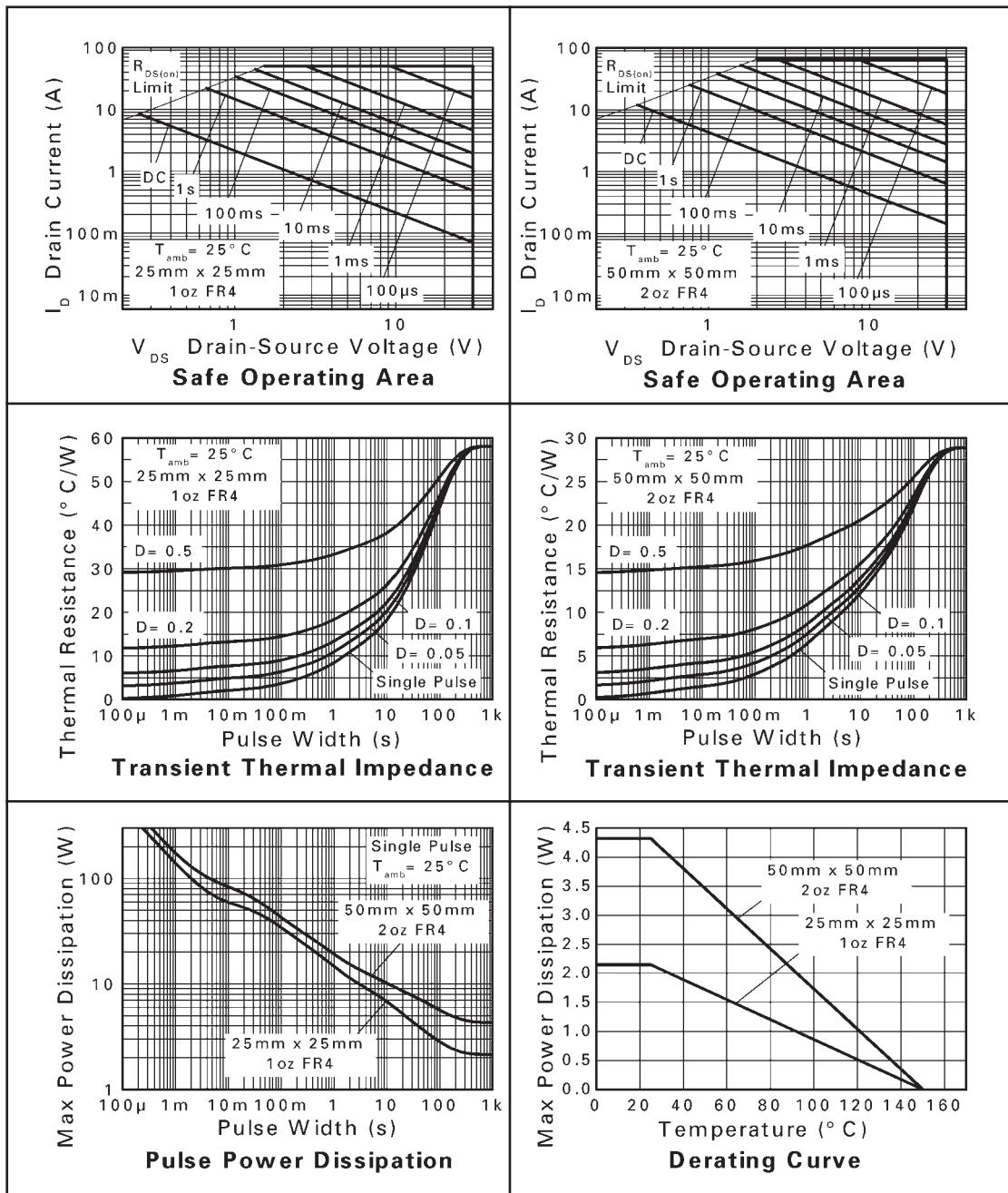
PARAMETER	SYMBOL	VALUE	UNIT
Junction to ambient <sup>(a)</sup>	$R_{\Theta JA}$	29	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\Theta JA}$	12.3	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\Theta JA}$	58	°C/W

### NOTES

- (a) For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
- (b) For a device surface mounted on FR4 PCB measured at  $\leq 10$  sec.
- (c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, D=0.02 pulse width=300μs - pulse width limited by maximum junction temperature.
- (d) For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

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## TYPICAL CHARACTERISTICS



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## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^\circ C$ unless otherwise stated)

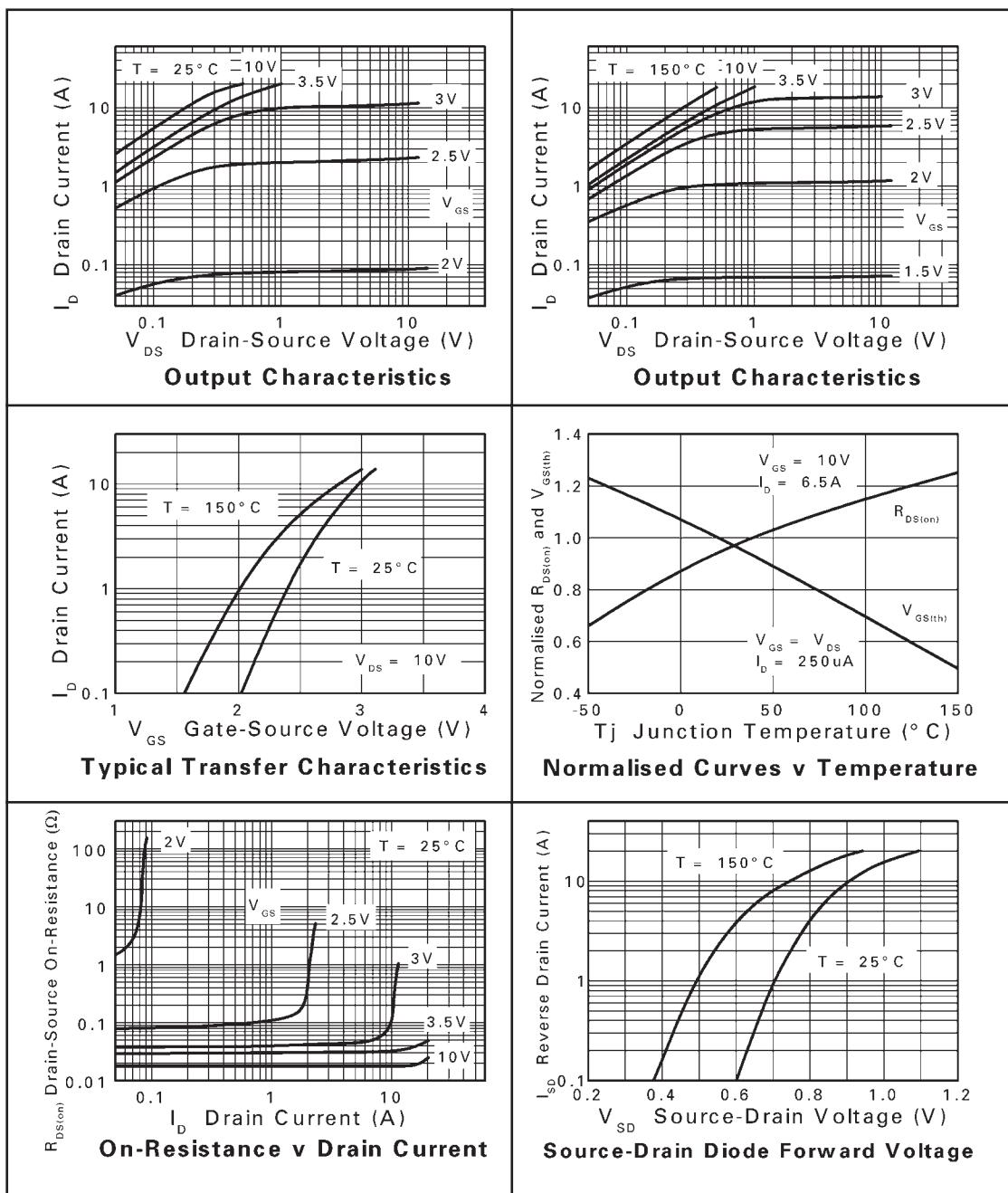
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
<b>STATIC</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	30			V	$I_D = 250\mu A, V_{GS}=0V$
Zero gate voltage drain current	$I_{DSS}$			0.5	$\mu A$	$V_{DS}= 30V, V_{GS}=0V$
Gate-body leakage	$I_{GSS}$			100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Gate-source threshold voltage	$V_{GS(th)}$	1.0			V	$I_D = 250mA, V_{DS}=V_{GS}$
Static drain-source on-state resistance <sup>(1)</sup>	$R_{DS(on)}$			0.02	$\Omega$	$V_{GS}= 10V, I_D = 12A$
				0.03	$\Omega$	$V_{GS}= 4.5V, I_D = 9.8A$
Forward transconductance <sup>(1) (3)</sup>	$g_{fs}$		22.1		S	$V_{DS}= 15V, I_D = 12.6A$
<b>DYNAMIC <sup>(3)</sup></b>						
Input capacitance	$C_{iss}$		1890		pF	$V_{DS}= 15V, V_{GS}=0V$ $f=1MHz$
Output capacitance	$C_{oss}$		349		pF	
Reverse transfer capacitance	$C_{rss}$		218		pF	
<b>SWITCHING<sup>(2) (3)</sup></b>						
Turn-on-delay time	$t_{d(on)}$		5.2		ns	$V_{DD}= 15V, I_D = 1A$ $R_G \leq 6.0\Omega, V_{GS}= 10V$
Rise time	$t_r$		6.1		ns	
Turn-off delay time	$t_{d(off)}$		38.1		ns	
Fall time	$t_f$		20.2		ns	
Total gate charge	$Q_g$		19.9		nC	$V_{DS}= 15V, V_{GS}= 5V$ $I_D = 6.5A$
Total gate charge	$Q_g$		36.8		nC	$V_{DS}= 15V, V_{GS}= 10V$ $I_D = 6.5A$
Gate-source charge	$Q_{gs}$		5.8		nC	
Gate drain charge	$Q_{gd}$		7.1		nC	
<b>SOURCE-DRAIN DIODE</b>						
Diode forward voltage (1)	$V_{SD}$		0.85	0.95	V	$T_j=25^\circ C, I_S = 6.8A,$ $V_{GS}=0V$
Reverse recovery time (3)	$t_{rr}$		18.4		ns	$T_j=25^\circ C, I_S = 2.3A,$ $di/dt=100A/\mu s$
Reverse recovery charge (3)	$Q_{rr}$		11		nC	

### NOTES

- (1) Measured under pulsed conditions. Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- (2) Switching characteristics are independent of operating junction temperature.
- (3) For design aid only, not subject to production testing.

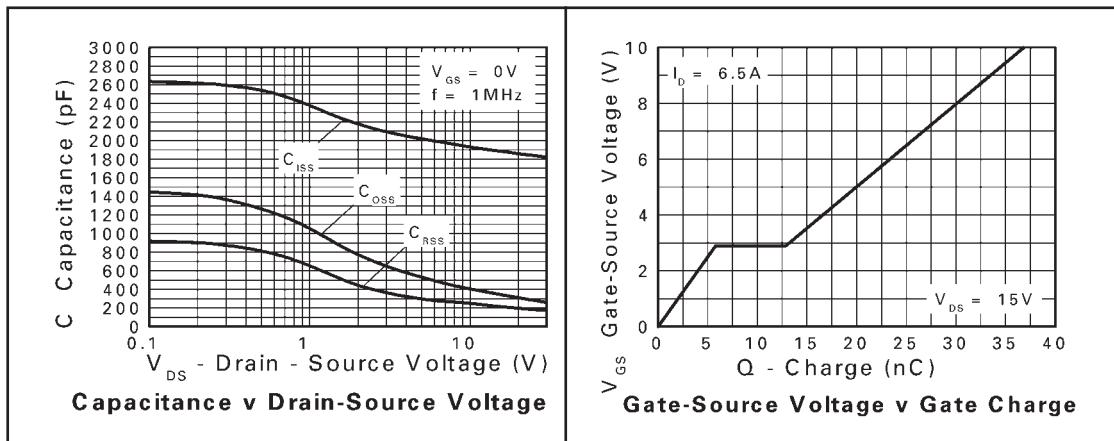
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## TYPICAL CHARACTERISTICS



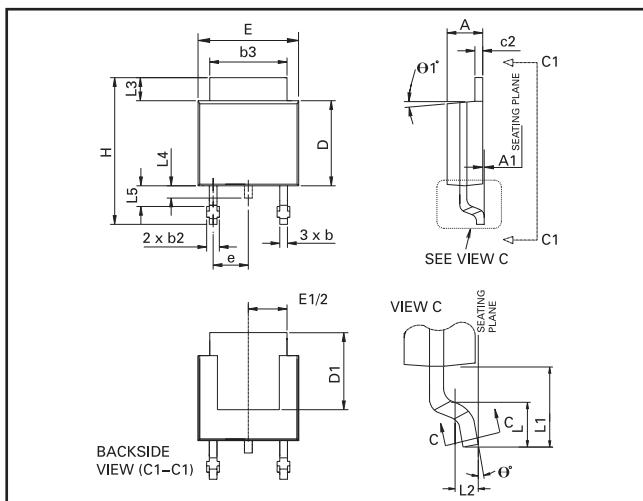
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## TYPICAL CHARACTERISTICS



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## PACKAGE OUTLINE



Controlling dimensions are in millimeters. Approximate conversions are given in inches

## PACKAGE DIMENSIONS

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	2.18	2.38	0.086	0.094	e	2.30	BSC	0.090	BSC
A1	—	0.127	—	0.005	H	9.40	10.41	0.370	0.410
b	0.635	0.89	0.025	0.035	L	1.40	1.78	0.055	0.070
b2	0.762	1.114	0.030	0.045	L1	2.74	REF	0.108	REF
b3	5.20	5.46	0.205	0.215	L2	0.051	BSC	0.020	BSC
c	0.457	0.609	0.018	0.024	L3	0.89	1.27	0.035	0.050
c2	0.457	0.584	0.018	0.023	L4	0.635	1.01	0.025	0.040
D	5.97	6.22	0.235	0.245	L5	1.14	1.52	0.045	0.060
D1	5.20	—	0.205	—	Θ1°	0°	10°	0°	10°
E	6.35	6.73	0.250	0.265	Θ°	0°	15°	0°	15°
E1	4.32	—	0.170	—	—	—	—	—	—

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